

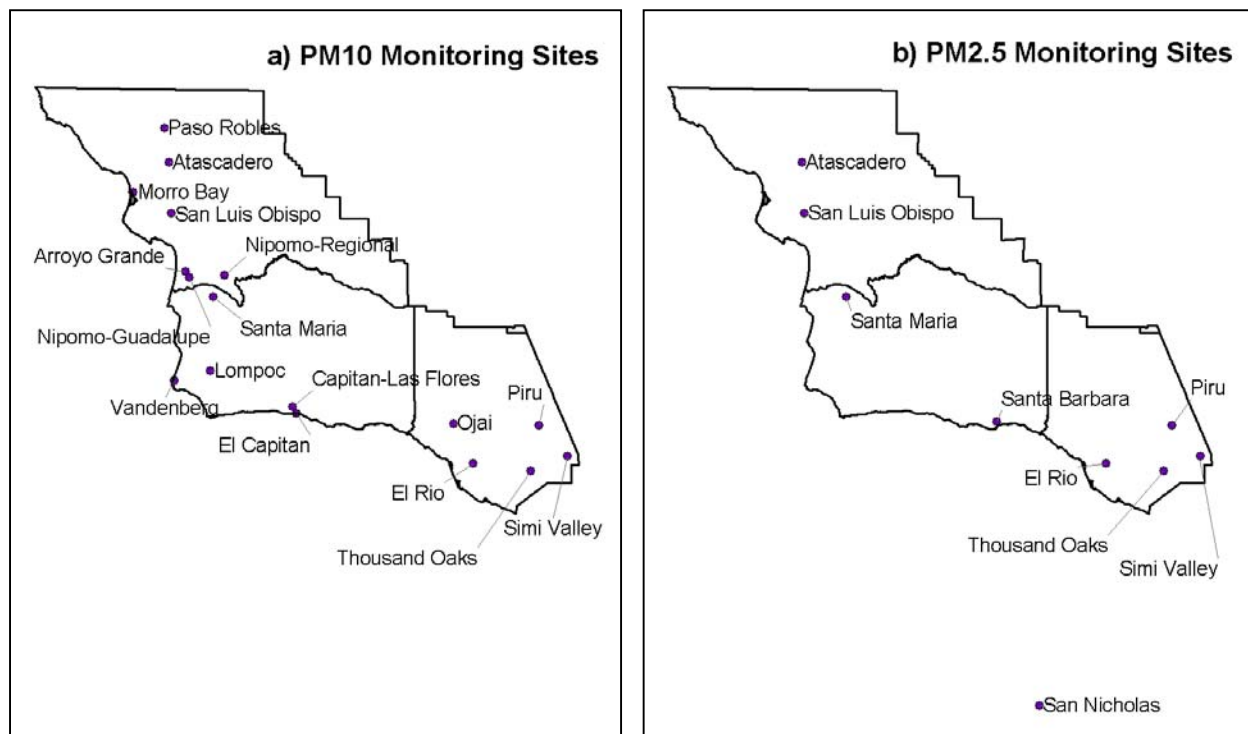
## N. South Central Coast Air Basin



The South Central Coast Air Basin is comprised of three air districts: the San Luis Obispo County APCD, which consists of San Luis Obispo County; the Santa Barbara County APCD, which consists of Santa Barbara County; and the Ventura County APCD, which consists of Ventura County. The entire air basin currently exceeds both the 24-hour and annual State PM<sub>10</sub> standards. The Ventura County APCD is currently designated as nonattainment for the State PM<sub>2.5</sub> standard, with the rest of the air basin designated as unclassified – available data are insufficient to support designation as attainment or nonattainment.

Figure N-1 shows the location of the PM<sub>10</sub> (a) and PM<sub>2.5</sub> (b) monitoring sites throughout the South Central Coast Air Basin.

**Figure N-1. PM<sub>10</sub> and PM<sub>2.5</sub> Monitoring Sites throughout the Air Basin.**



## **San Luis Obispo County APCD**

Table N-1 provides information on the highest PM10 and PM2.5 concentrations recorded across the San Luis Obispo County APCD in 2001 through 2003. During this period, particulate levels exceeded the State 24-hour standard of 50  $\mu\text{g}/\text{m}^3$  an estimated eighteen times. Annual PM10 levels exceeded the State standard of 20  $\mu\text{g}/\text{m}^3$  in 2001 and 2002. Particulate levels did not exceed the State annual PM2.5 standard of 12  $\mu\text{g}/\text{m}^3$ .

**Table N-1. PM10 and PM2.5 Air Quality in the San Luis Obispo County APCD.**

Year	PM10 ( $\mu\text{g}/\text{m}^3$ )			PM2.5 ( $\mu\text{g}/\text{m}^3$ )	
	Calculated Days over State Std.	Max 24-hour (Std.=50)	Max Annual Average (Std.=20)	Max 24-hour*	Max Annual Average (Std.=12)
2001	12	70	21	58	10
2002	0	46	21	28	9
2003	6	70	20	29	8

\* The maximum 24-hour PM2.5 values are provided for information only.

Table N-2 provides the 24-hour and annual designation values for the State standards for the 2001-2003 period. Designation values represent the highest 24-hour PM10 concentration measured during the three year period, after concentrations measured during highly irregular and infrequent events have been excluded, and the highest estimated PM10 and PM2.5 annual average in the same period. The designation values are determined for each site, and the highest site is used for determining an area's designation. Based on these data, the San Luis Obispo County APCD currently is nonattainment for both the State 24-hour and annual average PM10 standards. The District is designated as unclassified for the State annual PM2.5 standard – available data are insufficient to support designation as attainment or nonattainment.

**Table N-2. Air District Level Designation Values\* for the State PM10 and PM2.5 Standards (2001-2003 Period).**

	PM10 ( $\mu\text{g}/\text{m}^3$ )		PM2.5 ( $\mu\text{g}/\text{m}^3$ )
	24-Hour (Std.=50)	Annual Average (Std.=20)	Annual Average (Std.=12)
Designation Value	70	21	Incomplete Data

\* Designation value is the value used for determining attainment status. It is the highest measured value over three years after excluding highly irregular or infrequent events.

Table N-3 provides designation values for each monitoring site to provide further information on the geographic distribution of concentrations. Particulate levels exceeded the 24-hour PM10 standard at four of the five monitoring sites that have collected data (Atascadero, Morro Bay, Nipomo-Regional, and Paso Robles). At Paso Robles annual PM10 levels also exceeded the State annual standard. Although the data are not complete for all sites, annual average PM2.5 concentrations at Atascadero were below the State PM2.5 standard.

**Table N-3. Monitoring Site Level Designation Values\* for the State PM10 and PM2.5 Standards (2001-2003 Period).**

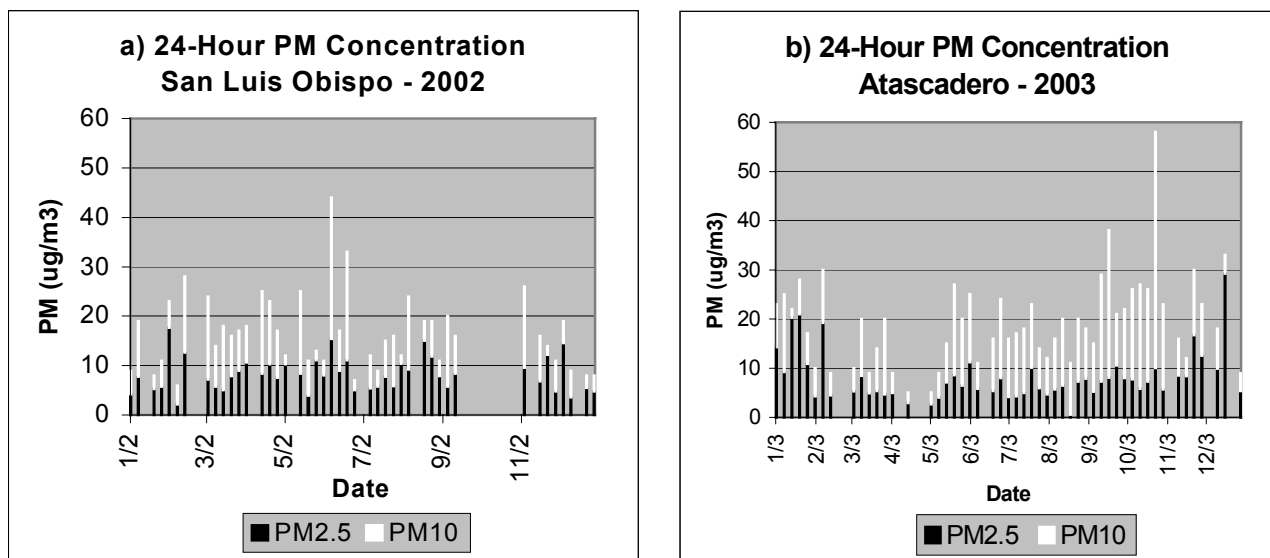
Site	PM10 (ug/m <sup>3</sup> )		PM2.5 (ug/m <sup>3</sup> )
	24-Hour (Std.=50)	Annual Average (Std.=20)	Annual Average (Std.=12)
Atascadero	57	Incomplete Data	10
Morro Bay	59	20	No Monitor
Nipomo-Guadalupe	Incomplete Data	Incomplete Data	No Monitor
Nipomo-Regional	70	Incomplete Data	No Monitor
Paso Robles	56	21	No Monitor
San Luis Obispo	45	19	Incomplete Data

\* Designation value is the value used for determining attainment status. It is the highest measured value over three years after excluding highly irregular or infrequent events.

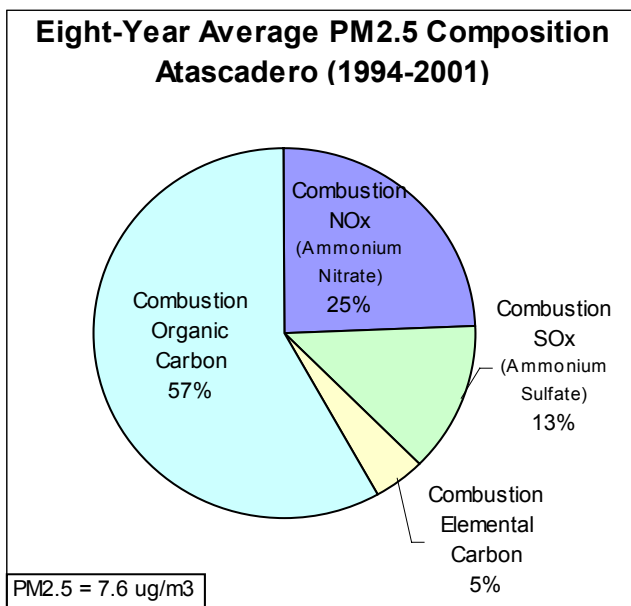
Figure N-2 illustrates the variation in PM10 and PM2.5 levels at San Luis Obispo (a) throughout 2002 and Atascadero (b) throughout 2003. The total height of the bars represents PM10 concentrations, while the height of the black portion of the bars represents the PM2.5 fraction. Peak PM10 concentrations occurred during the summer at San Luis Obispo and during the early fall at Atascadero and were dominated by the coarse fraction. The coarse fraction (particles between PM2.5 and PM10 in size) is primarily due to activities that resuspend dust, such as emissions from paved and unpaved roads and construction. In some coastal sites, sea salt can also contribute to the coarse fraction.

PM2.5 concentrations exhibit no distinct seasonal pattern at San Luis Obispo, but were higher during the winter months at Atascadero. The colder, more stagnant conditions during this time of the year are conducive to the buildup of PM, including the formation of secondary ammonium nitrate. In addition, increased activity from residential wood combustion may also occur. On an annual average, based on 2000-2003 monitoring data, we estimate that PM2.5 comprises approximately 47 percent of ambient PM10 at San Luis Obispo. At Atascadero, PM2.5 levels contribute approximately 59 percent to PM10 during the fall and winter, and approximately 39 percent during the rest of the year.

**Figure N-2. Seasonal Variation in PM10 and PM2.5 Concentrations.**



**Figure N-3. Eight-Year Average Chemical Composition of PM<sub>2.5</sub> and Link to Emission Source Type.**



Data for Figure N-3 are from analysis of ambient PM<sub>2.5</sub> data collected at Atascadero during the Southern California Children's Health Study. Chemical components have been associated with possible emission sources based on emission inventory information. On an annual average basis organic carbon is the major component of PM<sub>2.5</sub> (57 percent). The majority of organic carbon is suspected to be due to directly emitted carbon from combustion sources. Key sources include vehicles, residential wood combustion, agricultural and prescribed

burning, and other stationary combustion sources. However, a fraction may be due to secondary organic aerosol formation from anthropogenic and biogenic VOC emissions.

Ammonium nitrate and ammonium sulfate - formed in the atmosphere from chemical reactions of NO<sub>x</sub> and SO<sub>x</sub> from mobile and stationary combustion sources - also contribute significantly to ambient PM<sub>2.5</sub> (approximately 38 percent), with ammonium nitrate contributing twice as much as ammonium sulfate. Elemental carbon from combustion processes contributes to a lesser extent.

## **Santa Barbara County APCD**

Table N-4 summarizes maximum PM10 and PM2.5 concentrations recorded across the Santa Barbara County APCD in 2001 through 2003. During this period, particulate levels exceeded the State 24-hour standard of 50  $\mu\text{g}/\text{m}^3$  an estimated twenty-four times. Annual PM10 levels consistently exceeded the State standard of 20  $\mu\text{g}/\text{m}^3$ . Particulate levels did not exceed the State annual PM2.5 standard of 12  $\mu\text{g}/\text{m}^3$ .

**Table N-4. PM10 and PM2.5 Air Quality in the Santa Barbara County APCD.**

Year	PM10 ( $\mu\text{g}/\text{m}^3$ )			PM2.5 ( $\mu\text{g}/\text{m}^3$ )	
	Calculated Days over State Std.	Max 24-hour (Std.=50)	Max Annual Average (Std.=20)	Max 24-hour*	Max Annual Average (Std.=12)
2001	18	68	27	43	10
2002	0	50	24	21	10
2003	6	98**	25	24	9

\* The maximum 24-hour PM2.5 values are provided for information only.

\*\*This value was excluded for determining attainment status. See text.

Table N-5 provides the 24-hour and annual designation values for the State standards for the 2001-2003 period. Designation values represent the highest 24-hour PM10 concentration measured during the three year period, after concentrations measured during highly irregular and infrequent events have been excluded, and the highest estimated PM10 and PM2.5 annual average in the same period. For example, the high 24-hour PM10 concentration in 2003 shown in Table N-4 was identified as an extreme concentration event and was excluded in determining the designation values shown in Table N-5. The designation values are determined for each site, and the highest site is used for determining an area's designation. Based on these data, the Santa Barbara County APCD currently is nonattainment for both the State 24-hour and annual average PM10 standards. The District is designated as unclassified for the State annual PM2.5 standard – available data are insufficient to support designation as attainment or nonattainment.

**Table N-5. Air District Level Designation Values\* for the State PM10 and PM2.5 Standards (2001-2003 Period).**

	PM10 ( $\mu\text{g}/\text{m}^3$ )		PM2.5 ( $\mu\text{g}/\text{m}^3$ )
	24-Hour (Std.=50)	Annual Average (Std.=20)	Annual Average (Std.=12)
Designation Value	68	27	Incomplete Data

\* Designation value is the value used for determining attainment status. It is the highest measured value over three years after excluding highly irregular or infrequent events.

Table N-6 provides designation values for each monitoring site in the air district to provide further information on the geographic distribution of concentrations. Particulate levels exceeded the 24-hour standard only at Santa Maria. Annual average PM10 levels however exceeded the State Standard at three of the monitoring sites (Lompoc, Santa Maria, and Vandenberg). Although the data are not complete at all sites, annual average PM2.5 concentrations at Santa Maria were below the level of the State PM2.5 standard.

**Table N-6. Monitoring Site Level Designation Values\* for the State PM10 and PM2.5 Standards (2001-2003 Period).**

Site	PM10 (ug/m <sup>3</sup> )		PM2.5 (ug/m <sup>3</sup> )
	24-Hour (Std.=50)	Annual Average (Std.=20)	Annual Average (Std.=12)
Capitan-Las Flores # 1	39	15	No Monitor
El Capitan	41	20	No Monitor
Lompoc	45	21	No Monitor
Santa Barbara	No Monitor	No Monitor	Incomplete Data
Santa Maria	68	27	10
Vandenberg	50	21	No Monitor

\*Designation value is the value used for determining attainment status. It is the highest measured value over three years after excluding highly irregular or infrequent events.

**Figure N-4. Seasonal Variation in PM10 and PM2.5 Concentrations.**

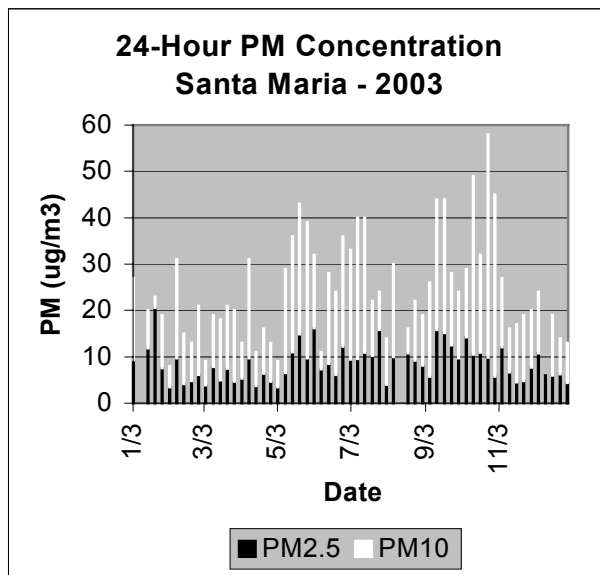


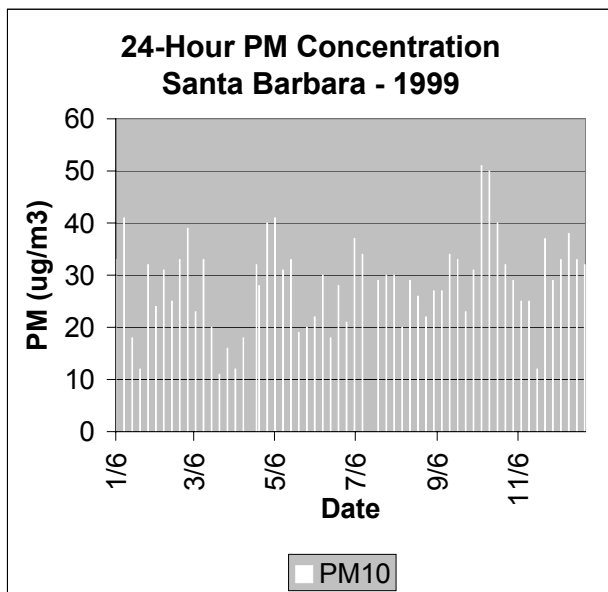
Figure N-4 illustrates variation in PM10 and PM2.5 levels at Santa Maria throughout 2003. The total height of the bars represents PM10 concentrations, while the height of the black portion of the bars represents the PM2.5 fraction. Higher PM10 concentrations occurred during the spring through early fall and were mostly driven by the coarse fraction (particles between PM2.5 and PM10 in size) is primarily due to activities that resuspend dust, such as emissions from paved and unpaved roads and construction.

In some coastal sites, sea salt can also contribute to the coarse fraction. PM2.5

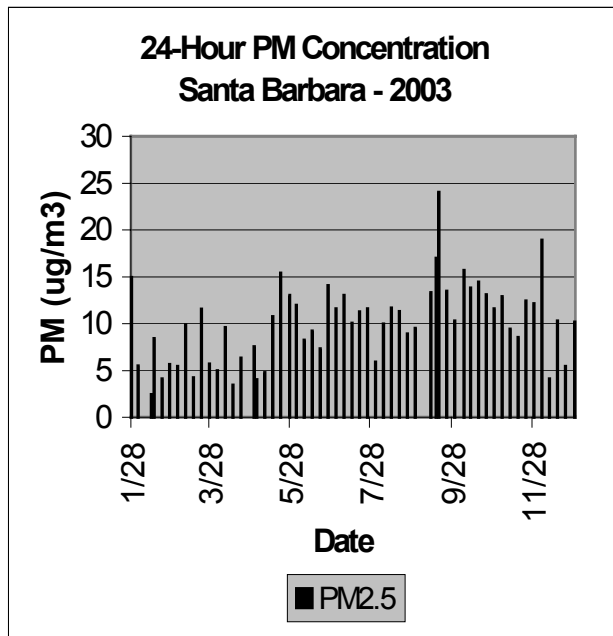
concentrations exhibit no distinct seasonal pattern. On an annual average, based on 2000-2003 monitoring data, we estimate that PM<sub>2.5</sub> comprises approximately 40 percent of ambient PM<sub>10</sub> at Santa Maria.

Figure N-5 illustrates the variation in PM<sub>10</sub> levels at Santa Barbara throughout 1999, while Figure N-6 shows the variation in PM<sub>2.5</sub> values throughout 2003. Both PM<sub>10</sub> and PM<sub>2.5</sub> exhibit no distinct seasonal pattern. On an annual average, based on limited 2000 monitoring data, we estimate that PM<sub>2.5</sub> comprises approximately 46 percent of ambient PM<sub>10</sub> at Santa Barbara.

**Figure N-5. Seasonal Variation in PM<sub>10</sub> Concentration.**



**Figure N-6. Seasonal Variation in PM<sub>2.5</sub> Concentration.**

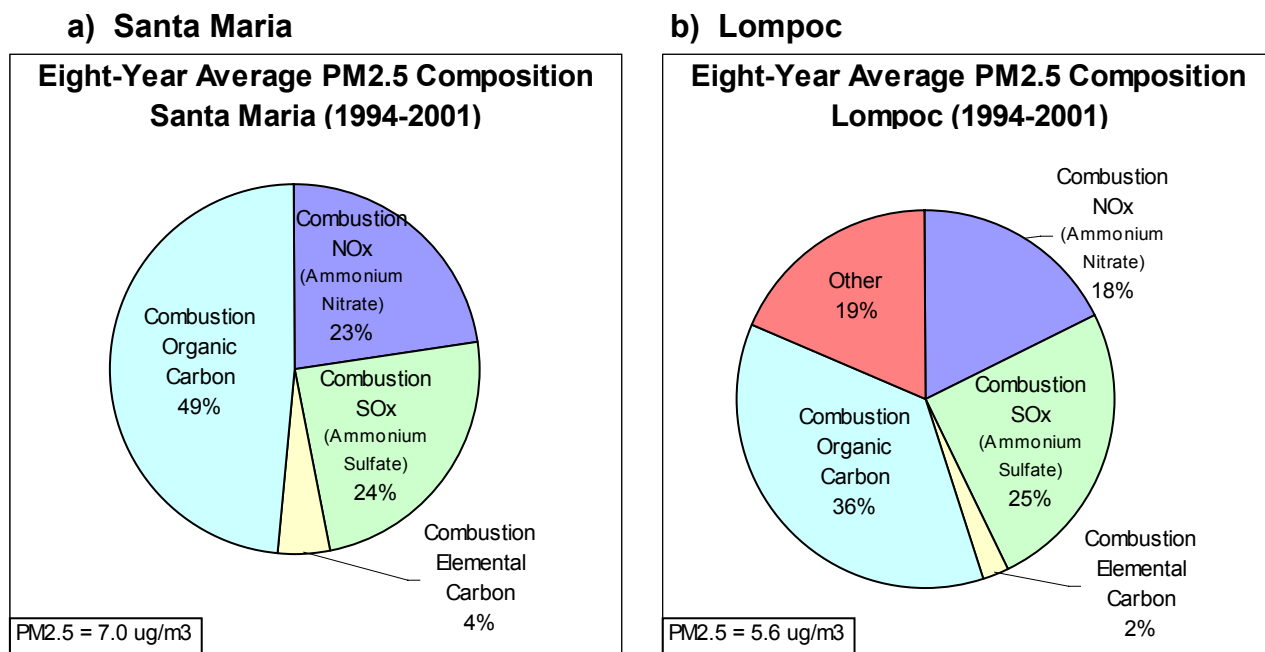




Data for Figure N-7 are from analysis of ambient PM<sub>2.5</sub> data collected at Santa Maria (a) and Lompoc (b) during the Southern California Children's Health Study. Chemical components have been associated with possible emission sources based on emission inventory information. On an annual average basis the major component of PM<sub>2.5</sub> is organic carbon (36 to 49 percent). The majority of organic carbon is suspected to be due to directly emitted carbon from combustion sources. Key sources include vehicles, agricultural and prescribed burning, and stationary combustion sources. However, a fraction may be due to secondary organic aerosol formation from anthropogenic and biogenic VOC emissions.

Ammonium nitrate and ammonium sulfate - formed in the atmosphere from chemical reactions of NO<sub>x</sub> and SO<sub>x</sub> from mobile and stationary combustion sources - also contribute significantly to ambient PM<sub>2.5</sub> (approximately 43 percent), with ammonium nitrate contributing twice as much as ammonium sulfate. Emissions from other sources, which in this case also include dust emissions from roads and other activities, contribute significantly to ambient PM<sub>2.5</sub> at Lompoc. Elemental carbon from combustion processes contribute to a lesser extent.

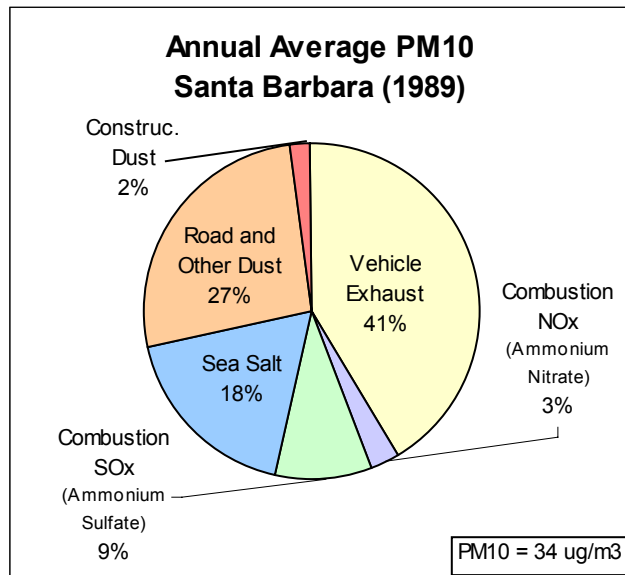
**Figure N-7. Eight-Year Average Chemical Composition of PM<sub>2.5</sub> and Link to Emission Source Type.**



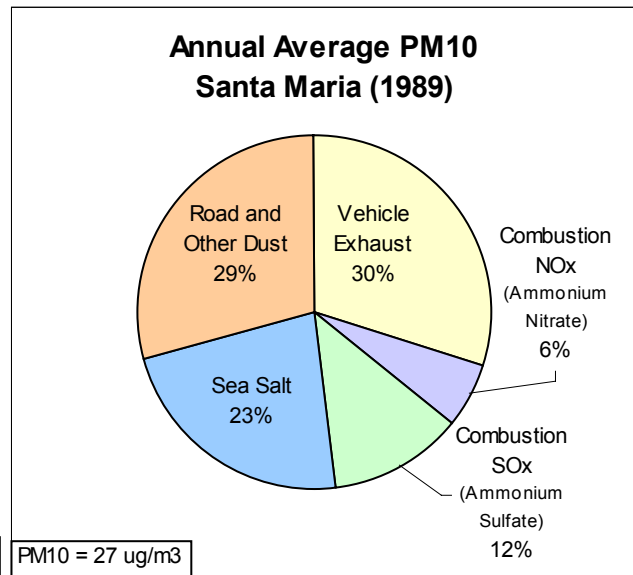
Data for Figure N-8 present the results of chemical mass balance modeling performed using ambient PM<sub>10</sub> data collected throughout 1989 at Santa Barbara (a) and Santa Maria (b) (Chow et al., 1996). The chemical mass balance modeling provides further resolution on the sources of organic and elemental carbon. Directly emitted particles from vehicle exhaust is the major contributor to PM<sub>10</sub> at both sites, with the contribution higher at Santa Barbara (41%) than at Santa Maria (30%). Road dust and dust from other dust producing activities is the second major contributor (29% at both sites). Sea salt is also a significant contributor to PM<sub>10</sub> (18% at Santa Barbara and 23% at Santa Maria).

**Figure N-8. Source Apportionment by Chemical Mass Balance.**

**a) Santa Barbara**



**b) Santa Maria**



## **Ventura County APCD**

Table N-7 summarizes maximum PM10 and PM2.5 concentrations recorded across the Ventura County APCD in 2001 through 2003. During this period, particulate levels exceeded the State 24-hour standard of 50  $\mu\text{g}/\text{m}^3$  an estimated sixty-eight times. Annual PM10 levels consistently exceeded the State standard of 20  $\mu\text{g}/\text{m}^3$ . Particulate levels also exceed the annual PM2.5 standard of 12  $\mu\text{g}/\text{m}^3$  in 2001.

**Table N-7. PM10 and PM2.5 Air Quality in the Ventura County APCD.**

Year	PM10 ( $\mu\text{g}/\text{m}^3$ )			PM2.5 ( $\mu\text{g}/\text{m}^3$ )	
	Calculated Days over State Std.	Max 24-hour (Std.=50)	Max Annual Average (Std.=20)	Max 24-hour*	Max Annual Average (Std.=12)
2001	18	77	29	50	15
2002	19	100	29	46	Incomplete Data
2003	31	169*	30	116**	12

\* The maximum 24-hour PM2.5 values are provided for information only.

\*\* These values were excluded for determining attainment status. See text.

Table N-8 provides the 24-hour and annual designation values for the State standards for the 2001-2003 period. Designation values represent the highest 24-hour PM10 concentration measured during the three year period, after concentrations measured during highly irregular and infrequent events have been excluded, and the highest estimated PM10 and PM2.5 annual average in the same period. For example, the high 24-hour PM10 and PM2.5 concentrations in 2003 shown in Table N-7 were due to wildfires and were excluded in determining the designation values shown in Table N-8. The designation values are determined for each site, and the highest site is used for determining an area's designation. Based on these data, the Ventura County APCD currently is nonattainment for both the State 24-hour and annual average PM10 standards. The District is also designated as nonattainment for the State annual PM2.5 standard.

**Table N-8. Air District Level Designation Values\* for the State PM10 and PM2.5 Standards (2001-2003 Period).**

	PM10 ( $\mu\text{g}/\text{m}^3$ )		PM2.5 ( $\mu\text{g}/\text{m}^3$ )
	24-Hour (Std.=50)	Annual Average (Std.=20)	Annual Average (Std.=12)
Designation Value	100	30	15

\* Designation value is the value used for determining attainment status. It is the highest measured value over three years after excluding highly irregular or infrequent events.

Table N-9 provides designation values for each monitoring site in the air district to provide further information on the geographic distribution of concentrations. Particulate levels exceeded both PM10 standards consistently across the air district. Highest 24-hour average and annual average PM10 concentrations occurred at El Rio and Simi Valley. Annual PM2.5 levels exceeded the State standard only at Simi Valley.

**Table N-9. Monitoring Site Level Designation Values\* for the State PM10 and PM2.5 Standards (2001-2003 Period).**

Site	PM10 (ug/m <sup>3</sup> )		PM2.5 (ug/m <sup>3</sup> )
	24-Hour (Std.=50)	Annual Average (Std.=20)	Annual Average (Std.=12)
Thousand Oaks	59	27	12
El Rio	100	29	Incomplete Data
Ojai	58	23	No Monitor
Piru	51	27	11
San Nicholas	No Monitor	No Monitor	12
Simi Valley	88	30	15

\* Designation value is the value used for determining attainment status. It is the highest measured value over three years after excluding highly irregular or infrequent events.

**Figure N-9. Seasonal Variation in PM10 and PM2.5 Concentrations.**

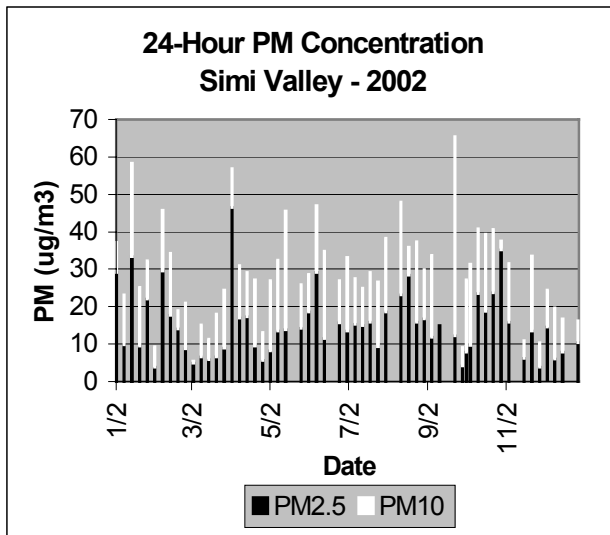
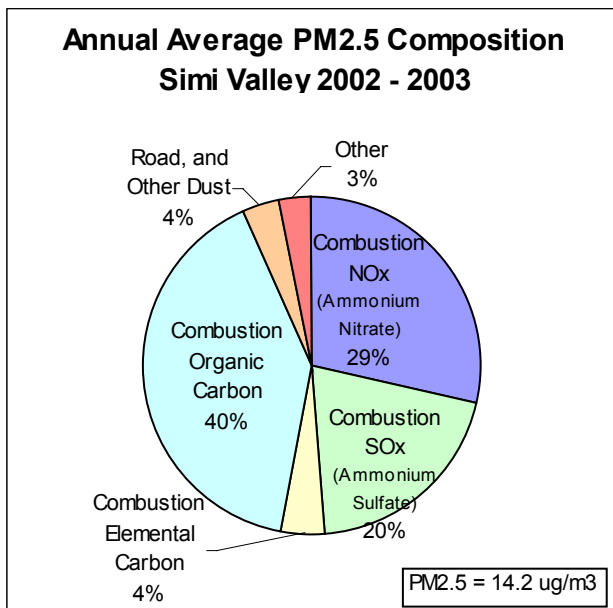


Figure N-9 illustrates the variation in PM10 and PM2.5 levels throughout 2002 at Simi Valley. The total height of the bars represents PM10 concentrations, while the height of the black portion of the bars represents the PM2.5 fraction. Both PM10 and PM2.5 exhibit no distinct seasonal pattern. On an annual average, based on 2000-2003 monitoring data, we estimate that PM2.5 comprises approximately 47 percent of ambient PM10.

**Figure N-10. Annual Average Chemical Composition of PM<sub>2.5</sub> and Link to Emission Source Type.**



Data for Figure N-10 are from analysis of ambient PM<sub>2.5</sub> data collected at Simi Valley from the State's PM<sub>2.5</sub> speciation network. Chemical components have been associated with possible emission sources based on emission inventory information. On an annual average basis the major component of PM<sub>2.5</sub> is organic carbon (approximately 40 percent). The majority of organic carbon is expected to be due to directly emitted carbon from combustion sources. However, a fraction may be due

to the secondary organic aerosol formation from anthropogenic and biogenic VOC emissions. Key sources include vehicles, residential wood combustion, agricultural and prescribed burning, and other stationary combustion sources.

Ammonium nitrate and ammonium sulfate - formed in the atmosphere from chemical reactions of NO<sub>x</sub> and SO<sub>x</sub> from mobile and stationary combustion sources - also contribute significantly to ambient PM<sub>2.5</sub> (approximately 49 percent), with ammonium nitrate contributing twice as much as ammonium sulfate. Dust from roads and other dust producing activities and elemental carbon from combustion processes contribute to a lesser extent.

Figure N-11 illustrates the quarterly variation in PM<sub>2.5</sub> levels and its chemical components expressed in  $\mu\text{g}/\text{m}^3$  (a) and as percent of PM<sub>2.5</sub> (b) at Simi Valley. As in the previous figure, chemical components have been associated with possible emission sources based on emission inventory information. The higher PM<sub>2.5</sub> levels during the summer are due to larger contributions of the organic carbon and ammonium sulfate components. Sunny, warmer conditions during the spring and summer favor the formation of secondary ammonium sulfate, and may also increase secondary organic aerosol formation as well.

**Figure N-11. Average Quarterly Chemical Composition of PM<sub>2.5</sub> and Link to Emission Source Type.**

